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AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

Claim 1 (Currently Amended)   A method for load-balancing subscriber sessions across a plurality of tunnel termination devices comprising:

receiving a network access request and user information from a subscriber device;

authenticating the user information with an access concentrator of a network service provider;

retrieving tunnel definitions associated with the user information received from the subscriber device, the tunnel definitions defining a plurality of preference levels, wherein each preference level specifies a different subset of the plurality of tunnel termination devices;

selecting a first one of the preference levels defined by the tunnel definitions;

upon authenticating the user information, selecting a tunnel termination device from the subset of the one-of-a plurality of tunnel termination devices specified by the first one of the preference levels based on weightings associated with each of the plurality of tunnel termination devices specified by the first preference level;, wherein selecting the one of the plurality of tunnel termination devices is performed prior to establishing any network tunnel with any of the plurality of tunnel termination devices for terminating a subscriber session associated with the subscriber device; and

attempting to establish[[ing]] a network tunnel between the selected one of the plurality of tunnel termination devices and the access concentrator;

upon failing to establish the network tunnel with the selected tunnel termination device:

selecting a second one of the preference levels defined by the tunnel definitions;

selecting a tunnel termination device from the subset of the plurality of tunnel termination devices specified by the second preference level based on weightings associated with each of the plurality of tunnel termination devices of the second preference level; and

establishing a network tunnel between the selected one of the plurality of tunnel termination devices specified by the second preference level and the access concentrator.

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Claim 2 (Currently Amended)   The method of claim 1, further comprising calculating the weightings based on a resource constraint associated with each of the plurality of tunnel termination devices specified by the user information for the selected preference level.

Claim 3 (Currently Amended)   The method of claim 2, wherein calculating the weightings comprises calculating the weightings based on a maximum number of subscriber sessions supported by each of the plurality of tunnel termination devices specified by the user information for the selected preference level.

Claim 4 (Original)   The method of claim 1, further comprising assigning the weightings to the tunnel termination devices based on user input.

Claim 5 (Currently Amended)   The method of claim 1, further comprising wherein selecting a tunnel termination device comprises:

issuing a query to receive the tunnel definitions associated with the user information received from the subscriber device, wherein the tunnel definitions associate each of the plurality of tunnel termination devices with preference levels;

selecting one of the preference levels;

identifying a subset of the plurality of tunnel termination devices associated with the selected one of the preference levels;

calculating the weightings for each of the tunnel termination devices of the selected preference level identified subset; and

selecting one of the plurality of tunnel termination devices of the selected preference level identified subset based on the calculated weightings.

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Claim 6 (Currently Amended)   The method of claim 5, wherein calculating the weightings
further comprises:

determining a maximum number of subscriber sessions supported by each of the plurality
of tunnel termination devices of the <u>selected preference level</u> identified-subset; and

calculating the weighting associated with each of the plurality of tunnel termination
devices of the <u>selected preference level</u> subset as a function of the maximum number of
subscriber sessions supported by each of the plurality of tunnel termination devices of the
<u>selected preference level</u> identified-subset.

Claim 7 (Original)   The method of claim 1, wherein establishing a network tunnel comprises
establishing a network tunnel in accordance with the Layer Two Tunneling Protocol (L2TP).

Claim 8 (Original)   The method of claim 1, wherein establishing a network tunnel comprises
establishing one of a Multiprotocol Label Switching (MPLS) tunnel, a Generic Routing
Encapsulation (GRE) tunnel, and an IP Security (IPSEC) tunnel.

Claim 9 (Previously Presented)   The method of claim 1, wherein establishing a network
tunnel comprises establishing a network tunnel from an edge router to the selected one of the
plurality of tunnel termination devices.

Claim 10 (Original)   The method of claim 1,

wherein selecting one of a plurality of tunnel termination devices comprises selecting one
of a plurality of Layer Two Tunneling Protocol (L2TP) Network Servers (LNSs) based on
weightings associated with the LNSs, and

wherein establishing a network tunnel comprises establishing an L2TP tunnel with the
selected one of the LNSs.

Claim 11–13 (Canceled)

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Claim 14 (Currently Amended)   The method of claim 1 [[11]], further comprising:

determining whether a preference level fail-over setting is enabled upon failing to establish the network tunnel with the selected one of the tunnel termination devices at the first preference level; and

selecting a different one of the plurality of tunnel termination devices at the first preference level a second one of the tunnel termination devices from the set of tunnel termination devices when the preference level fail-over option is enabled; and

attempting to establish a network tunnel between the selected different one of the plurality of tunnel termination devices at the first preference level and the access concentrator.

Claim 15 (Currently Amended)   The method of claim 14, further comprising:

wherein selecting a second preference level comprises updating the selected preference level to the second preference level upon failing to establish the network tunnel between the selected different one of the plurality of tunnel termination devices at the first preference level and the access concentrator and when the preference level fail-over option is disabled[[;]], further comprising:

selecting a second set of tunnel termination devices from the plurality of tunnel termination devices based on the updated preference level;

calculating the weightings associated with each of the tunnel termination devices of the second preference level set based on resource constraints for the respective tunnel termination device, and

wherein selecting one of the tunnel termination devices of the second preference level is set based on the calculated weightings.

Claim 16–18 (Canceled)

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Claim 19 (Currently Amended)   A network device comprising:

one or more processors;

a connection handler executed by the processors to receive network access requests and user information from subscriber devices;

an authentication handler to authenticate the user information and to receive tunnel definitions associated with the user information received from the subscriber devices that defines a plurality of preference levels, wherein each preference level specifies a subset of a plurality of tunnel termination devices;

a tunneling module executed by the processors to load balance subscriber sessions across a plurality of tunnel termination devices at a first preference level based on a resource constraint associated with the tunnel termination devices, wherein the tunneling module selects a tunnel termination device at a second preference level when a network tunnel cannot be established with a tunnel termination device at the first preference level.;

~~wherein, for each of the subscriber sessions, the tunneling module selects one of the plurality of tunnel termination devices prior to establishing a network tunnel with any of the plurality of the tunnel termination devices for terminating the subscriber session associated with the subscriber device.~~

Claim 20 (Currently Amended)   The network device of claim 19, wherein the tunneling module load balances the subscriber sessions across the plurality of tunnel termination devices at the first preference level based on a maximum number of subscriber session supported by each of the tunnel termination devices at the first preference level.

Claim 21 (Currently Amended)   The network device of claim 19, wherein the tunneling module assigns weightings to the plurality of tunnel terminations devices at the first preference level, and selects the one of the plurality of tunnel termination devices at the first preference level as a destination for a network tunnel[[s]] in accordance with the assigned weightings.

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Claim 22 (Currently Amended)   The network device of claim 21 wherein the tunneling

module calculates the weightings based on a maximum number of subscriber sessions supported

by each of the plurality of tunnel termination devices at the first preference level.

Claim 23 (Currently Amended)   The network device of claim 19, wherein the tunneling

module assigns the weighting for each of the plurality of tunnel termination devices at the first

preference level based on user input.

Claim 24 (Currently Amended)   The network device of claim 19, further comprising:

an authorization manager that generates data identifying a the plurality of tunnel

termination devices and associating the plurality of tunnel termination devices with subscriber

the plurality of preference levels based on the user information received from subscriber devices,

wherein the tunneling module load balances the subscriber sessions across the plurality of

tunnel termination devices in accordance with the associated subscriber plurality of preference

levels.

Claim 25 (Previously Presented)   The network device of claim 24, wherein the tunneling

module identifies a subset of the plurality of tunnel termination devices associated with a current

one of the subscriber preference levels, calculates the weightings for each of the tunnel

termination devices of the identified subset, and selects one of the tunnel termination devices of

the identified subset based on the calculated weightings.

Claim 26 (Original)   The network device of claim 19, wherein the tunneling module establishes

network tunnels with the tunnel termination devices in accordance with the Layer Two Tunneling

Protocol (L2TP).

Claim 27 (Original) The network device of claim 19, wherein the tunneling module establishes

network tunnels with the tunnel termination devices in accordance with one of the Multiprotocol

Label Switching (MPLS) protocol, the Generic Routing Encapsulation (GRE) protocol, and the

IP Security (IPSEC) protocol.

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Claim 28 (Previously Presented)   The network device of claim 19, wherein the network

device comprises an edge router, and a tunneling protocol establishes network tunnels from the

edge router to the plurality of tunnel termination devices.

Claim 29 (Original)   The network device of claim 19, wherein the network device comprises a

Layer Two Tunneling Protocol (L2TP) Access Concentrator (LAC), and the tunnel termination

devices comprise L2TP Network Servers (LNSs).

Claim 30 (Currently Amended)   A computer-readable storage medium comprising

instructions to cause a processor to:

        receive a network access request and user information from a subscriber device;

        authenticate the user information with an access concentrator of a network service

provider;

        receive tunnel definitions associated with the user information received from the

subscriber device that define a plurality of preference levels, wherein each preference level

specifies a subset of a plurality of tunnel termination devices;

        select a first preference level based on the user information;

        select one of a plurality of tunnel termination devices at the first preference level based on

weightings associated with each of the plurality of tunnel termination devices at the first

preference level; ~~wherein selection of the one of the plurality of tunnel termination devices is~~

~~performed prior to establishing a network tunnel with any of the plurality of tunnel termination~~

~~devices for terminating a subscriber session associated with the subscriber device; and~~

        attempt to establish a network tunnel between the access concentrator and the selected

one of the tunnel termination devices at the first preference level;

        upon failing to establish the network tunnel,

                select a second preference level based on the user information;

                select one of a plurality of tunnel termination devices at the second preference

        level based on weightings associated with each of the plurality of tunnel termination

        devices at the second preference level; and

                attempt to establish a network tunnel between the selected one of the plurality of

        tunnel termination devices at the second preference level and the access concentrator.

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Claim 31 (Currently Amended)   The computer-readable medium of claim 30, further comprising instructions to cause the processor to calculate the weightings for each of the plurality of tunnel termination devices at a selected preference level based on resource constraints associated with the tunnel termination devices at the selected preference level.

Claim 32 (Currently Amended)   The computer-readable medium of claim 31, further comprising instructions to cause the processor to calculate the weightings for the tunnel termination devices at a selected preference level based on a maximum number of subscriber sessions supported by each of the tunnel termination devices at the selected preference level.

Claim 33 (Previously Presented)   The computer-readable medium of claim 30, further comprising instructions to cause the processor to assign the weighting for each of the plurality of tunnel termination devices based on user input.

Claim 34 (Currently Amended)   The computer-readable medium of claim 30, further comprising instructions to cause the processor to:

issue a query to receive the tunnel definitions that associate the plurality of tunnel termination devices with preference levels;

select one of the preference levels;

identify a subset of the plurality of tunnel termination devices associated with the selected one of the preference levels;

calculate the weightings for each of the tunnel termination devices of the selected preference level identified subset; and

select one of the tunnel termination devices of the selected preference level subset based on the calculated weightings.

Claim 35 (Currently Amended)   The computer-readable medium of claim 34, further comprising instructions to cause the processor to:

determine a maximum number of subscriber sessions supported by each of the tunnel termination devices of the ~~selected preference level subset~~; and

calculate the weighting associated with each of the tunnel termination devices of the ~~selected preference level identified subset~~ as a function of the maximum number of subscriber sessions supported by each of the tunnel termination devices of the ~~selected preference level identified subset~~.

Claim 36 (Original)   The computer-readable medium of claim 30, wherein the instructions cause the processor to establish a network tunnel in accordance with the Layer Two Tunneling Protocol (L2TP).

Claim 37 (Original)   The computer-readable medium of claim 30, further wherein the instructions cause the processor to establish one of a Multiprotocol Label Switching (MPLS) tunnel, a Generic Routing Encapsulation (GRE) tunnel, and an IP Security (IPSEC) tunnel.

Claim 38 (Previously Presented)   The computer-readable medium of claim 30, wherein the instructions cause the processor to establish a network tunnel from an edge router to the selected one of the tunnel termination devices.

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Claim 39 (Currently Amended)   A system comprising:

a subscriber device; and

an Internet Service Provider (ISP) comprising:

a Layer Two Tunneling Protocol (L2TP) Access Concentrator (LAC), and

a plurality of L2TP Network Servers (LNSs),

wherein the LAC receives a network access request and user information from the subscriber device, authenticates the user information, receives tunnel definitions associated with the user information received from the subscriber device that define a plurality of preference levels, wherein each preference level specifies a different subset of the plurality of LNSs.

wherein the LAC selects a first preference level based on the user information, applies a weighted load-balancing process to select one of the LNSs within the subset of the LNSs specified by the first preference level, and attempts to establish an L2TP tunnel associated with the subscriber device with the selected one of the LNSs at the first preference level, and

wherein, upon failing to establish an L2TP tunnel with the selected one of the LNSs at the first preference level, the LAC selects a second preference level and applies a weighted load-balancing process to select one of the LNSs within the subset of the LNSs specified by the second preference level and attempts to establish an L2TP tunnel associated with the subscriber device with the selected one of the LNSs at the second preference level. ~~prior to establishing any L2TP tunnel with any~~ one ~~of the plurality of the LNSs for terminating a subscriber session associated with the subscriber device.~~

Claim 40 (Currently Amended)   The system of claim 39, wherein the LAC applies the weighted load-balancing process by calculating weightings for each of the plurality of LNSs at the selected preference level based on resource constraints associated with each of the plurality of LNSs at the selected preference level.

Claim 41 (Currently Amended)   The system of claim 40, wherein the LAC calculates the weightings based on a maximum number of subscriber sessions supported by each of the plurality of LNSs at the selected preference level.

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Claim 42 (Currently Amended)   The system of claim 39, wherein the LAC applies the weighted load-balancing process by assigning weightings to each of the plurality of LNSs at the selected preference level based on user input.

Claim 43 (New)   The method of claim 1, further comprising, upon establishing the network tunnel between the selected one of the plurality of tunnel termination devices specified by the second preference level and the access concentrator, establishing a subscriber session associated with the subscriber device over the network tunnel.

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